

THE VALIDITY OF THE TAXON *Bothriembryon tasmanicus* (PULMONATA : BULIMULIDAE)

by

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ABSTRACT

The name *Bothriembryon tasmanicus* (Pfeiffer, 1853) is in valid use for the Tasmanian bulimulid species. The name *Bulimus gunnii* (Sowerby, 1845) is correctly used for a possible Oligocene fossil of which only one specimen, the holotype, is apparently known.

INTRODUCTION

Confusion exists concerning the correct specific name for the Recent Tasmanian terrestrial snail placed in the genus *Bothriembryon*. *Bulinus gunnii* Sowerby (in Strzelecki, 1845), a south Tasmanian fossil has chronologic priority over *Bulimus tasmanicus* Pfeiffer, 1853. Some authors have regarded them as being conspecific. "*Bulinus*" was an apparent error for *Bulimus* although the latter name appeared only in the index. The fossil, from the Geilston Travertine, was reported as of Pliocene age. Malacologists consulting the original references were unaware of their inadequacy.

Iredale (1937) rejected *B. gunnii* on the basis of "uncertain status". In his research on the Bulimulidae Breure (1978, 1979a, 1979b) used *Bothriembryon (Tasmanembryon) gunnii* (Sowerby, 1845) for the Recent species. This paper discusses evidence aimed at stabilizing the taxonomy.

TAXONOMY

Bulimus gunnii (Sowerby, 1845)
Figures 1 - 2

1845 *Bulinus gunnii* Sowerby in Strzelecki, p. 298, pl. xix, fig. 6 (not 5).

1878 *Bulimus gunnii* Etheridge, p. 177.

1880 *Bulimus gunnii* Johnston, p. 90.

1885 *Bulimus gunnii* Johnston, p. 219.

1888 *Bulimus gunnii* Johnston, p. 283, pl. 34, fig. 7.

1897 *Liparus gunni* Harris, p. 3.

1968 *Bothriembryon gunnii* McMichael, p. 150.

1980 *Bothriembryon gunnii* Ludbrook, p. 90.

The name *Bulinus gunnii* was introduced for a fossil of reputed Pliocene age from the "yellow limestone of Hobart Town". The description was brief without dimensions, but a comparison was made with a species "*Bulinus granulosis*". The use of the generic "*Bulinus*", generally dismissed, may have been a printing error. The illustration (in Strzelecki, 1845) showed a bulimulid-shaped fossil embedded aperture down in matrix. Harris (1897) described the holotype in the British Museum (N.H.) as an internal cast. He suggested a close relationship between *B. gunnii* and *Bulimus (Liparus) leeuwinensis* Smith, a Western Australian species.

Dr. P. Mordan (pers. comm.) advised that the holotype of *B. gunnii* in the British Museum (N.H.) "is a well preserved cast, although the apex is missing . . . The dimensions (without about $1\frac{1}{2}$ whorls of the apex) are height 25.1 mm, width 13.9 mm".

Johnston (1888) figured a complete specimen of *B. gunnii*. Johnston's figure (Figure 2) is comparable to the Western Australian *Bothriembryon* but differs from Sowerby's holotype figure (Figure 1). McMichael (1968) used the description of the *B. gunnii* holotype by

Harris (1897) for comparison with his fossil *Bothriembryon praecursor*. He considered the original description inadequate for comparative purposes. Ludbrook (1980) makes clear that a valid comparison such as that by McMichael is impossible.

Dr. Ludbrook (pers. comm.) suggests an early Miocene age for the genus *Bothriembryon* in Australia. Ludbrook (1980) states that the holotype is the only known *B. gunnii* specimen.

Bothriembryon tasmanicus (Pfeiffer, 1853)
Figure 3

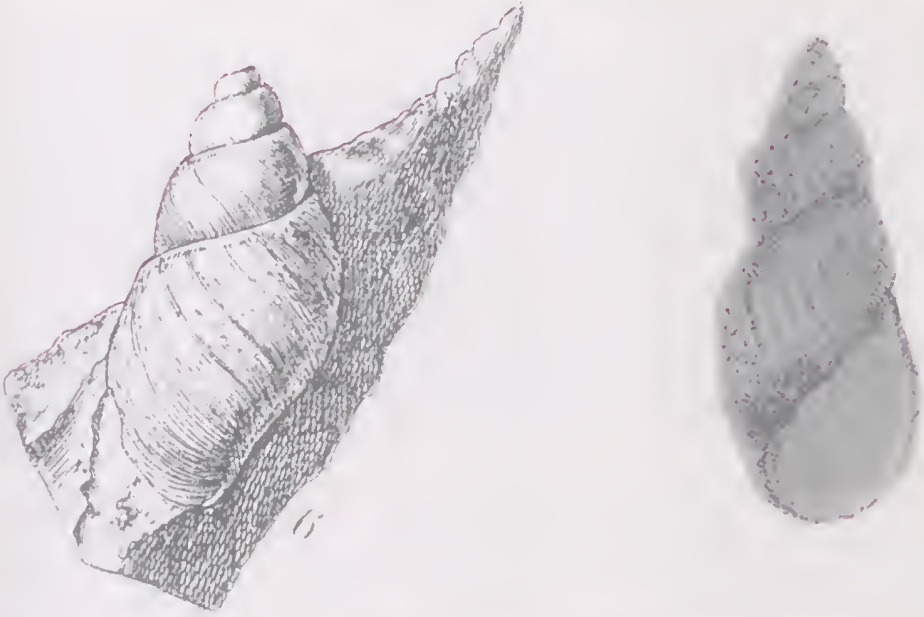
- 1853 *Bulimus tasmanicus* Pfeiffer, p. 260.
- 1860 *Buliminus tasmanicus* Martens in Albers, p. 228.
- 1868 *Bulimus tasmanicus* Cox, p. 72, pl. 13, fig. 1.
- 1871 *Bulimus tasmanicus*, Legrand, Species 2.
- 1879 *Bulimus tasmanicus* Petterd, p. 47.
- 1880 *Bulimus tasmanicus* Johnston, p. 11.
- 1880 *Bulimus tasmanicus* Johnston, p. 90.
- 1882 *Bulimus gunni* Brazier, p. 121.
- 1883 *Bulimus fasmanicus* Johnston, p. 144.
- 1891 *Bulimus tasmanicus* Hedley, p. 21, pl. 2.
- 1900 *Bothriembryon gunni* Pilsbry, p. 18, pl. 3, figs. 50, 51, 52.
- 1900 *Bothriembryon gunni* var. *brachysoma* Pilsbry, p. 19, pl. 3, fig. 53.
- 1909 *Bothriembryon gunnii* Petterd & Hedley, p. 285.
- 1921 *Bothriembryon gunnii* May, p. 92.
- 1923 *Bothriembryon gunnii* May, pl. 42, fig. 7.
- 1933 *Tasmanembryon fasmanicus* Iredale, p. 41.
- 1937 *Tasmanembryon tasmanicus* Iredale, p. 313.
- 1955 *Tasmanembryon tasmanicus* Kershaw, p. 327.
- 1958 *Tasmanembryon fasmanicus* Macpherson in May, pl. 42, fig. 7.
- 1972 *Tasmanembryon tasmanicus* Dartnall, p. 7.
- 1978 *Bothriembryon gunnii* Breure, p. 209.
- 1979 *Bothriembryon brachysoma* Breure, p. 96.
- 1979 *Bulimus gunnii* Breure, p. 96.
- 1979 *Bulimus tasmanicus* Breure, p. 96.
- 1979 *Bothriembryon gunnii* Breure, p. 110, fig. 6.
- 1979 *Bothriembryon tasmanicus* Smith & Kershaw, p. 128.
- 1980 *Tasmanembryon tasmanicus* Ludbrook, p. 90.

Dr. P. Mordan (pers. comm.) reports that there are two syntypes of *B. tasmanicus* in the British Museum (N.H.).

Martens (in Albers, 1860) placed *Caryodes dufresnii* and *B. fasmanicus* together in a sub-genus *Caryodes*, but he continued to use *Liparus* for Western Australian bulimulid shells. *Bulimus* was used for the Tasmanian species by Cox (1868) whom Legrand, Petterd and Johnston predictably followed. Johnston (1880b) suspected a relationship between the fossil and Recent species. He stated "From the fragments of the species submitted to me, I should infer that it is closely allied to the existing species *B. fasmanicus*". This statement is significant. He based his inference on fragments he did not collect. Moreover, these fragments could not have been the complete specimen he later illustrated in 1888. All this material is now missing (Ludbrook, 1980). Subsequently Johnston (1883) again used *B. fasmanicus*, apparently still unsure of the status of the name.

Brazier (1882) used the name *B. gunni* for a fossil from the Kent Group, Bass Strait, without description or illustration. He quoted from Johnston's discussion (1880b) then gave his "opinion" that there was no difference "between *B. gunnii* and *B. fasmanicus*". This assumption, undoubtedly influenced by the highly regarded Johnston, could only in fact be applied to Brazier's own specimen.

Pilsbry (1894) replaced the pre-occupied *Liparus* with *Bothriembryon* for the Western Australian species. His introduction (in notes and news) was somewhat unorthodox and could easily have been overlooked by Harris (1897). Pilsbry (1900) accepted *B. gunnii* for *B. tasmanicus* and introduced a variety "*brachysoma*" with the locality "East coast of Tasmania (Petterd)". Petterd (1879) did in fact refer to variation in this group and this will be considered elsewhere. But Petterd also remarked on a resemblance between *B. gunnii*



FIGURES

1. *Bulimus gunnii* (Sowerby) after Sowerby (in Strzelecki, 1845).
2. *Bulimus gunnii* (Sowerby) after Johnston (1888).
3. *Bothriembryon* (*Tasmanembryon*) *tasmanicus* (Pfeiffer). (Photograph by courtesy John Simmons, Launceston).

and *B. tasmanicus*. The dates suggest that he and Johnston could have discussed the matter.

Pilsbry's acceptance without question of Brazier's conclusion resulted in Petterd & Hedley (1909) and May (1921, 1923) also accepting the name *B. gunnii* for the Recent form. The earlier literature could be divided into that using *B. gunnii* for the fossil and that using *B. tasmanicus* for the Recent species.

Iredale (1933) expressed doubt as to the relationships of *B. tasmanicus*. Dissections by Dartnall (pers. comm.) and myself closely relate the species to the Bulimulidae. It is not related to *Caryodes dulresnii*. Iredale (1937) corrected the taxonomy and relegated *B. gunnii* to limbo. He regarded *B. gunni* var. *brachysoma* as a variety only. Kershaw (1955), Macpherson (in May 1958) and Dartnall (1972) agreed with the use of the name *B. tasmanicus*. Breure (1978) reverted to the name *B. gunnii* for a Pliocene (*sensu* Strzelecki) to Recent species. Consequently Breure (1979a, 1979b) used *B. gunnii* and Smith & Kershaw (1979) used *B. tasmanicus* for the same species.

In the affinity speculation Brazier (1882) apparently copied Johnston (1880b) who has used fragmentary material. Harris (1897) reached a different conclusion to Johnston and Brazier when redescribing the holotype of *B. gunnii*. A valid conclusion that the two morphs were con-specific would require a study of the holotypes of which one, that of *B. gunnii*, was not satisfactory for the purpose.

THE GEILSTON BAY TRAVERTINE

The type locality of the fossil *B. gunnii* was given as "In Yellow limestone of Hobart Town". At the time two quarries were known, one at Geilston Bay and one at Upper Burnett Street in Hobart (Banks, 1971a). Both could be described as having yellowish limestone. I have seen the preserved outcrop at Geilston Bay. The other quarry is not now visible (Banks, 1971b).

Johnston (1880b) reported on the Geilston Travertine describing the known and new species of snails. He repeated Sowerby's description of *B. gunnii* but gave the locality "near Yellow Limestone, Hobart Town". Whether this difference was an error or referred to his fragmentary specimen is not clear. Johnston (1888) in a further report included his belief that this was Darwin's "Travertine with extinct plants". Banks (1971b) demonstrated this belief to be incorrect as Darwin's material came from Upper Burnett Street.

Ludbrook (1980) suggested that there is some uncertainty concerning the quarry from which the Strzelecki snails came. Banks (1971b) discussed Strzelecki material but not the snails. I can find no reference to snails from the Upper Burnett Street site at all. Johnston (1882) stated that he was gulded to this quarry by Legrand who would presumably have noted snails had any been apparent. No other likely quarry can be identified.

Although his initial material was poor and probably not *in situ*, Johnston consistently and clearly indicated that the snails came from Geilston. The one exception was his (1880a) distribution paper in which he referred to "yellow limestone" and gave the age as Miocene. He clearly stated (1885a) that the snails came from the Geilston lower beds (i.e., sub-basalt). He also distinguished these from the "Upper Members" overlying the basalt (1885b). The section at Geilston he (1888) described gave travertine and plants with snails commencing 3 to 3.6 m below the basalt, immediately below the bed containing marsupial bones. This section was accepted by Tedford *et al.* (1975) who provided supporting evidence.

Tedford *et al.* state that "the basalt yielded an apparent age of 22.4 ± 0.5 Myr. "approximating the Oligocene-Miocene boundary". They therefore concluded the Geilston Travertine below the basalt "to be Late Oligocene or older". This means the snail bed must be at least this age. There can be no doubt that this is the bed from which snails equivalent to *B. gunnii* came whatever that specimen may be. It is therefore probable that the Geilston Travertine was the "yellow limestone of Hobart Town".

No other hypothesis can be proved on the evidence. Furthermore, Ludbrook (1980) quotes McCormick who found no snails in the "Hobart Town quarry", but only at Geilston including "*Helix* and *Bulimus*".

THE KENT GROUP BASS STRAIT

Brazier's (1882) brief report on a fossil *Bulimus* given him by Professor Stephens "from Kent's Group, Bass' Strait" said to be "found in the Travertine of that group", greatly influenced the status of *B. gunnii*. Descriptions and maps of these islands were given by Le Souef (1891), Mullet & Murray-Smith (1967), Marginson & Murray-Smith (1969), Jones, Marginson & Murray-Smith (1970) and Last (1979). The geologic environment is dominated by bold granite cliffs and plentiful limestone. No reference to travertine has been noted.

Johnston (1879) mentioned a white limestone on the road to the Deal Island lighthouse. Garreau (1958) mentioned outcrops of dune limestone. Hope (1974) mentioned "coastal calcarenite and sands".

Johnston (1881) described a fossil snail (*Helix simsoniana*) from "calcareous sandstone (tertiary), Kent's Group". He equated the rock to the Helicidae Sandstone of the eastern Bass Strait islands (Johnston, 1879), but in the next paragraph expressed doubt between this "or the tertiary group, of which the Geilston travertine is a member". I postulate that Brazier's reference to travertine could have come from this comment. A specimen of *H. simsoniana* seen by me is a cast unlike the Helicidae Sandstone fossils which are of Pleistocene age (Kershaw & Sutherland, 1972). There can be little doubt that most, if not all, the limestone is equivalent to the dune limestone of Dimmock (1957) and the aeolian calcarenite of Kershaw & Sutherland (1972).

Le Souef (1891) reported a jaw bone of the "Giant Kangaroo (*M. gigas*)" from the Kent Group. An appended letter by F. McCoy to the report mentioned "the Old Man Kangaroo (*Macropus major*)". The *Proceedings of the Royal Society of Tasmania* for April, 1881, p. ii, records from Wm. Tarleton "Bones of Recent Marsupials, Animals, etc., from a calcareous deposit on Kent's Group, Bass Straits (The bones were found in a cavity 50 ft. in depth, washed out by floods, and situated 600 ft. above sea level). Specimens of *Helix simsoniana* from the same locality". A November, 1884, record was "Marsupial bones and pumice stone, etc., from Deal Island, Kent's Group, Mr. Johnston". Deal Island is the apparent locality of the undefined reference.

Hope (1974) gave the Deal Island dune habitat as open savannah on European settlement with the natural vegetation as "dry sclerophyll forest, woodland and heaths". *Bothriembryon* could have survived in such a habitat near the coast during the Pleistocene. It was not listed as occurring in Helicidae Sandstone by Johnston (1879) and is not currently recorded from the islands. It could be suggested that its normal habitat would preclude it surviving an interglacial or post-glacial sea level rise. Thus the height of Tarleton's fossil deposit is interesting although it may not be the site of Brazier's fossil. Johnston (1881) related his *Helix simsoniana* to the Recent *Anoglypta launcestonensis*, a rain forest species. But a slip was inserted, following his plate, on which he suggests a relationship with Recent New Zealand rhytidids.

The nearest morphologically similar Tasmanian carnivorous snail to *H. simsoniana* is *Tasmaphena lamproides*. This species prefers a moist habitat (Smith & Kershaw, 1979). Consideration of these snails does not assist with our knowledge of the bulimulid fossil.

Gill (1967) referred to snails in Late Pleistocene and Holocene deposits in Victoria. *Bothriembryon* was not included. *Helicarion* has continuous distribution from Victoria through the islands into Tasmania. It could easily survive on the slopes of peaks marking the land bridge. Hope (1974) gives a hypothesis providing an explanation for some distributional problems. The Kent and Hogan Groups may occupy a significant position between Tasmania and Victoria.

Johnston (1882) and Banks (1971a) describe the habitat at Geilston occupied by the fossil snails. Dartnall (1972) and Smith & Kershaw (1979) comment on the habitat of Recent *Bothriembryon*.

Despite an apparently suitable habitat, no evidence that *Bothriembryon* existed on Bass Strait islands except for the reputed bulimulid fossil, has yet been found. No evidence of the age of the fossil other than that the travertine may have been aeolianite can be presented. It is postulated that it came from Deal Island where fossils have been collected. It is difficult to believe that a distinctive travertine deposit would have been overlooked. That the fossil was provided by Professor W. Stephens tends to validate the locality although nothing else is known. The age could be considered to be either Tertiary or Early Pleistocene. The former age could explain a resemblance to *B. gunnii*. The latter age may indicate that *Bothriembryon* did migrate northwards during low sea level but did not survive interglacial fluctuation. It can only be concluded that Brazier saw in a fossil of unknown age and facies a resemblance to the fossil *B. gunnii* which itself proves to be inadequate as comparative material.

SUMMARY AND CONCLUSIONS

The taxon *B. tasmanicus* Pfeiffer has been accepted for Recent Tasmanian bulimulid species by Martens (in Albers, 1861), Cox (1868), Legrand (1871), Petterd (1879), Johnston (1880a, 1883), Hedley (1891), Iredale (1933, 1937), Kershaw (1955), Macpherson (in May, 1958), Dartnall (1972). It was questioned by Johnston (1880b) and rejected by Brazier (1882) using Johnston's comments. Pilsbry (1900) followed Johnston and Brazier.

Petterd & Hedley (1909) and May (1921, 1923) followed Pilsbry. Johnston (1880a), Etheridge (1878) Johnston (1888), and Harris (1879) used *B. gunnii* for the fossil. Other

authors have not questioned its validity until Breure (1978) used *B. gunnii* for the Recent species. But Ludbrook (1980) discussing the fossil concludes that "paucity of material is a barrier to confirming the identity of the fossil".

Harris (1897) using the holotype of *B. gunnii* saw a different relationship to that seen by Johnston and Brazier. The Harris concept and Johnston's (1888) illustration conflict with the illustration in Strzelecki (1845). This makes comparison between *B. gunnii* and *B. tasmanicus* dubious. Johnston (1880b) inferred synonymy using poor material but later appears to have changed his mind. However, Brazier (1882) accepted Johnston's inference for a fossil which it may or may not be possible to relate to either species. Pilsbry (1900) in accepting the situation without question, influenced subsequent authors for 23 years.

The weight of evidence does not support the use of the name *B. gunnii* Sowerby for the Recent species most commonly known as *B. tasmanicus* Pfeiffer. There is no apparent conflict in status between the two species, only in the interpretation of the Tertiary fossil *B. gunnii*. The concept that *B. gunnii* and *B. tasmanicus*, supported only by suggested generic resemblance and inferred opinion, are conspecific, cannot be substantiated.

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